SN 07/423665

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 100 459**
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: 83106668.3

(22) Date of filing: 07.07.83

(51) Int. Cl.³: A 61 K 47/00
A 61 K 7/48

(30) Priority: 07.07.82 JP 116919/82

(43) Date of publication of application:
15.02.84 Bulletin 84/7

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI NL SE

(71) Applicant: Eisai Co., Ltd.
6-10, Koishikawa 4-chome Bunkyo-ku
Tokyo 112(JP)

(72) Inventor: Shigemitsu, Osawa
2286-12, Suehiro-cho
Honjyo-shi Saitama Prefecture(JP)

(72) Inventor: Iwao, Amada
644-1, Naka
Fujioka-shi Gumma Prefecture(JP)

(74) Representative: Hansen, Bernd, Dr.rer.nat. et al,
Hoffmann, Eitle & Partner Patentanwälte
Arabellastrasse 4
D-8000 München 81(DE)

(54) **An aqueous liquid containing a fat-soluble substance.**

(57) A clear and stable aqueous liquid containing as essential components a fat-soluble substance and lecithin, as well as ethanol and/or iso-propanol. The volume of the alcohol is not more than 50 V/V % of the aqueous liquid, and the amount of lecithin is determined from the following:

(1) not more than 0.1 part by weight when less than 50 parts by weight of ethanol is used per part by weight of the fat-soluble substance;

(2) not more than 50 parts by weight when at least 50 parts by weight of ethanol is used per part by weight of the fat-soluble substance; or

(3) not more than 50 parts by weight when iso-propanol or a mixture of ethanol and iso-propanol is used.

EP 0 100 459 A2

Croydon Printing Company Ltd.

AN AQUEOUS LIQUID CONTAINING A FAT-SOLUBLE SUBSTANCE

This invention relates to an aqueous liquid containing a fat-soluble substance.

Examples have heretofore been known in which large amounts of nonionic surface-active agents are used in order to clearly dissolve or emulsify fat-soluble substances in water. It is well known, however, that by any of various administration methods, nonionic surface-active agents cause some undesirable trouble to humans. In view of this, techniques were developed for using lecithin, a natural substance with relatively high safety, instead of synthetic surfactants, as seen, for example, in Japanese Patent Applications Laid-Open Nos. 62010/1980, 147228/1980, 38314/1980, 83912/1977, 83911/1977, 50124/1974 and 126821/1975. With these techniques, exertion of a strong mechanical stress is required in order to supplement the weak emulsifying power of lecithin. Furthermore, since the average particle diameter of particles in the resulting emulsion is as large as 0.5 μm or more and the particle size distribution is broad, the stability of the emulsion with the lapse of time is not sufficient. With this background, some of the present inventors studied a system

composed of a fat-soluble substance, lecithin and ethanol, and discovered a system composed of 1 part by weight of a fat-soluble substance, 0.1 to 10 parts by weight of lecithin and 1 to 50 parts by weight of ethanol, which can be emulsified by addition of water. An invention based on this discovery was applied for a patent in Japanese Patent Application Laid-Open No. 56315/1978.

Subsequently, the present inventors studied a system consisting essentially of a fat-soluble substance, lecithin and an alcohol, which can be converted to a stable emulsion or solution by a simple convenient method. It is necessary that the concentration of alcohol in the emulsion or solution should be as high as 20 to 50% for example, in order to use the emulsion or solution as a lotion, a skin lotion, a milky lotion, etc. The present inventors made investigations in order to obtain such a system. Generally, the addition of a large amount of an alcohol to an emulsion or solution of a fat-soluble substance prepared by emulsifying or dissolving it with the aid of a surface-active substance such as lecithin adversely affects the emulsion or solution, and such an addition, without adverse effects, has been considered to be a difficult technique. For example, BBA 298 (1973) 1015-1019 reported that when an ethanol solution of lecithin was added to a 0.16M aqueous solution of KCl, the concentration of ethanol in the resulting solution was 7.5% at the highest.

In order, therefore, to prepare a stable emulsified or solubilized system by adding a fat-soluble substance and lecithin to an aqueous solution of an alcohol at a high concentration, it is considered necessary to set certain numerical limitations on the proportions of these ingredients to be blended.

The present inventors studied systems containing various components starting with a system containing an alcohol at a high concentration, in view of the need to use an emulsified or solubilized liquid containing a fat-soluble substance, lecithin and an alcohol as essential components as a lotion, a skin lotion, a milky lotion, etc. It was first found that besides ethanol, isopropanol can be used as the alcohol, and ethanol or isopropanol can be incorporated at a concentration of up to 50% by volume. It was also found that when the alcohol is ethanol to be incorporated at a concentration of not more than 50% and it is added in an amount of less than 50 parts by weight per part by weight of the fat-soluble substance, the amount of lecithin should be not more than 0.1 part by weight; when ethanol is incorporated in an amount of 50 parts by weight or more per part by weight of the fat-soluble substance, the amount of lecithin should be not more than 50 parts by weight; and when the alcohol is isopropanol, the amount of lecithin should be not more than 50 parts by weight. The foregoing findings have led to the present invention.

It is an object of this invention to provide a stable emulsified or solubilized liquid containing a fat-soluble substance, lecithin and ethanol or isopropanol as essential components by blending the individual components at certain specified ratios.

According to this invention, there is provided an aqueous liquid containing a fat-soluble substance, lecithin and at least one alcohol selected from the group consisting of ethanol and isopropanol as essential components, the volume of said alcohol being not more than 50 V/V % of the aqueous liquid, and the amount of lecithin being determined from the following:

(1) not more than 0.1 part by weight when ethanol is used as the alcohol in an amount of less than 50 parts by weight per part by weight of the fat-soluble substance;

(2) not more than 50 parts by weight when ethanol is used as the alcohol in an amount of at least 50 parts by weight per part by weight of the fat-soluble substance; and

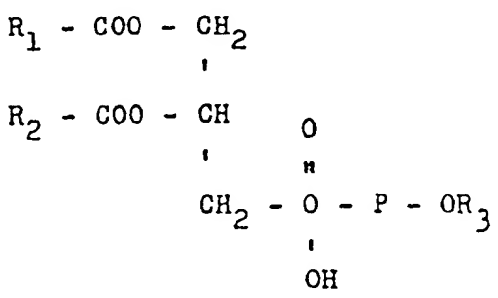
(3) not more than 50 parts by weight when iso-propanol or a mixture of ethanol and iso-propanol is used as the alcohol.

The aqueous liquid containing a fat-soluble substance in accordance with this invention denotes an emulsion or

solution. The aqueous liquid contains a fat-soluble substance, lecithin as well as ethanol and/or iso-propanol as essential components.

The fat-soluble substance used in this invention denotes one or more of fat-soluble substances for medicines, cosmetics and foodstuffs, which are soluble in ethanol or iso-propanol. Specific examples include fat-soluble vitamins such as vitamins A, E and K, derivatives of these fat-soluble vitamins, coenzymes such as CoQ_8 and CoQ_{10}, isoprenoids such as gefarnate, ethyl decaprenoate and vitamin A acid retinoid, derivatives of these isoprenoids, methyl salicylate, monoglycol salicylate, ℓ-menthol, camphor, α-bisabolol, glycyrrhetinic acid and its derivatives. Also included are p-aminobenzoic acid, octyldimethyl p-aminobenzoic acid, ethylbenzoic acid, squalane, isopropyl myristate, myristyloctyl dodecyl, octyl dodecanol, and vegetable oils. The vegetable oils denote sesame oil, soybean oil, olive oil, etc.

Lecithin used in this invention denotes a phospholipid-containing substance extracted from egg yolk or a vegetable oil and optionally purified, or a hydrogenation product thereof. It also denotes synthetic glycerophosphoric acid esters of the following general formula, or mixtures thereof.



In the formula, R_1 and R_2 each represent a hydrogen atom or a saturated or unsaturated hydrocarbon having 8 to 20 carbon atoms, and R_3 represents a hydrogen atom, choline, ethanolamine, serine, inositol, glycerol, etc.

Ethanol and iso-propanol are used either singly or in combination. When they are used in combination, the ratio between the two may be any desired one. The volume of ethanol, iso-propanol or ethanol-isopropanol is not more than 50% of the aqueous liquid of this invention containing a fat-soluble substance. The percentage here expresses V/V%.

In the aqueous liquid of this invention, the proportions of the fat-soluble substance, lecithin and the alcohol are limited. They differ whether the alcohol used is ethanol, iso-propanol, or a mixture of ethanol and iso-propanol. When ethanol is used in an amount of less than 50 parts by weight per part by weight of the fat-soluble substance, the amount of lecithin is not more than 0.1 part by weight. When ethanol is used in an mount of at least 50 parts by weight per part by weight of the fat-soluble substance, the amount of lecithin is not more than 50 parts by weight.

When iso-propanol or the ethanol-isopropanol mixture is used as the alcohol, the amount of lecithin is not more than 50 parts by weight.

The aqueous liquid of this invention may optionally contain emulsifiers, isotonizing agent, buffers, dissolution aids, corrigents, antiseptics, stabilizers, etc. in addition to the essential components, as shown in Examples given hereinafter. The addition of these optional substances is free and does not limit the present invention.

The aqueous liquid of this invention is used for medicines, cosmetics and foodstuffs. Specific forms of the aqueous liquid include, for example, an injectable preparation, an orally administrable liquid preparation, a lotion, a hair tonic, a milky lotion, and a drink preparation.

The aqueous liquid of this invention may be prepared by general ordinary methods for the production of aqueous liquids. For example, the fat-soluble substance and lecithin are dissolved in ethanol, iso-propanol or an ethanol-isopropanol mixture. The solution is added to an aqueous solution containing optional components, and the mixture is stirred in an ordinary manner. The stirring may, for example, be carried out by applying a pressurizing treatment or an ultrasonication treatment.

The following Experimental Examples illustrate the effects of the present invention.

Experimental Example 1

Sample and method:-

Tocopherol acetate (0.02 g) and purified hydrogenated egg yolk lecithin (0.3 g) were dissolved in ethanol (0.1 - 60 ml) having each of the concentrations shown in Table 1. The solution was heated to about 40°C, and purified water warmed at about 35°C was injected under pressure into the solution with stirring to form an emulsion or solution. Purified water was added to adjust the total amount of the emulsion or solution to 100 ml and thus provide a sample. In these samples containing 1 part by weight of tocopherol acetate, 15 parts by weight of purified hydrogenated lecithin and 4 to 2400 parts by weight of ethanol were prepared, and their appearances and percent transmittances at 640 nm (T_{640}) were determined upon preparation and after storage for 30 days at 5°C and 45°C respectively.

Results:-

The results are summaried in Table 1. It is seen from Table 1 that stable aqueous liquids can be obtained when the concentration of ethanol is not more than 50 V/V %, particularly not more than 40 V/V %.

Table 1

Concentration of ethanol (V/V %)	Upon preparation		After storage at 45 °C for 30 days		After storage at 5°C for 30 days		Stability
	Appearance	T_{640} (%)	Appearance	T_{640} (%)	Appearance	T_{640} (%)	
0.1	Slightly emulsified	81.0	Same as left	76.5	Same as left	75.5	Nearly good
0.5	Somewhat emulsified	46.5	Same as left	42.7	Same as left	40.0	"
1.0	Emulsified	19.0	Same as left	16.2	Same as left	16.6	"
3.0	Slightly emulsified	74.0	Same as left	75.5	Same as left	72.5	Good
5.0	Slightly emulsified	84.5	Same as left	85.0	Same as left	84.5	Good
10.0	Almost clear	92.0	Same as left	93.5	Same as left	92.8	Good
20.0	Almost clear	92.5	Same as left	93.5	Same as left	92.5	Good
30.0	Almost clear	93.0	Same as left	89.5	Same as left	92.2	Good
40.0	Somewhat emulsified	54.5	Same as left	32.5	Same as left	56.0	Nearly good
50.0	Emulsified; lecithin partly precipitated	12.5	Same as left	3.4	Same as left	4.2	Somewhat poor
60.0	Lecithin partly precipitated; emulsified	-	Same as left	-	Same as left	-	Poor

The concentration of ethanol inthe table denotes the concentration (V/V %) of ethanol in the aqueous liquid.

Experimental Example 2

Sample and method:-

Squalane (0.5 g) and purified hydrogenated egg yolk lecithin (0.001 to 0.05 g) in the weight parts shown in Table 2 were dissolved in 20 ml of ethanol. The solution was heated to about 40°C. The solution was injected under pressure into purified water warmed at about 35°C with stirring to form an emulsion. The purified water was added to the emulsion to adjust its total amount to 100 ml and thus provide a sample. The resulting samples contained 1 part by weight of squalane, 0.002 to 0.1 part by weight of purified hydrogenated egg yolk lecithin and 32 parts by weight of ethanol, and the concentration of ethanol in each of the samples was 20 V/V %. The samples were left to stand for 30 days at 45°C, 5°C and room temperature, and changes in appearance and percent transmittances at 640 nm, T_{640}(%), were determined.

Results:-

Table 2 shows the results obtained with samples left to stand at room temperature for 30 days. No separation was observed in any of the samples after standing for 30 days at 45°C and 5°C, respectively. It is thus seen that when 32 parts by weight of ethanol is used per part by weight of squalane, the amount of purified hydrogenated egg yolk lecithin may be not more than 0.1 part by weight.

Table 2

Parts by weight of purified hydrogenated egg yolk lecithin	After standing for 30 days at room temperature		Stability
	Appearance	T_{640} (%)	
0.002	Uniform emulsion	52.2	Nearly good
0.004	Uniform emulsion	56.0	Good
0.01	Uniform, slightly bluish white emulsion	68.0	Good
0.02	Uniform, slightly bluish white emulsion	75.0	Good
0.1	Uniform emulsion	15.0	Nearly good

In the table, the parts by weight of purified hydrogenated egg yolk lecithin are per part by weight of squalane.

Experimental Example 3

Sample and method:-

Squalane (0.1 g) and purified soybean lecithin (0.03 g) were dissolved in iso-propanol (0.5 to 60 ml) having each of the concentrations shown in Table 3. Then, samples were prepared by the same procedure as in Experimental Example 1. Each of the samples contained 1 part by weight of squalane, 0.3 part by weight of purified soybean lecithin and 5 to 600 parts by weight of iso-propanol. By the same method as in Experimental Example 1, the stabilities of the samples were determined.

Results:-

The results are summaried in Table 3. It is seen from Table 3 that stable aqueous liquids can be obtained when the concentration of iso-propanol is not more than 50 V/V %.

Table 3

Concentration of isopropanol (V/V %)	Upon preparation		After storage at 45°C for 30 days		After storage at 5°C for 30 days		Stability
	Appearance	T_{640} (%)	Appearance	T_{640} (%)	Appearance	T_{640} (%)	
0.5	Emulsified; oil afloat slightly	14.8	Same as left	15.2	Same as left	14.2	Nearly good
1.0	Slightly emulsified; uniformly dispersed	31.6	Same as left	30.5	Same as left	31.8	Nearly good
2.0	Slightly emulsified	75.0	Same as left	74.9	Same as left	72.2	Good
5.0	Slightly emulsified	81.2	Same as left	82.2	Same as left	80.8	Good
10.0	Almost clear	92.5	Same as left	93.2	Same as left	91.5	Good
20.0	Clear	99.3	Same as left	98.8	Same as left	99.2	Good
30.0	Clear	99.1	Same as left	98.9	Same as left	99.1	Good
40.0	Emulsified; uniformly dispersed	24.3	Same as left	26.5	Same as left	24.0	Nearly good
50.0	Emulsified; uniformly dispersed	17.5	Same as left	23.2	Same as left	15.5	Nearly good
60.0	Separated into two layers; the oil layer separated as an upper layer)	-	Same as left	-	Same as left	-	Poor

In the table, the concentration of isopropanol denotes the concentration (V/V %) of isopropanol in the aqueous liquid.

Experimental Example 4

Squalane (0.1 g) and purified hydrogenated egg yolk lecithin (0.001 to 6 g) corresponding to the weight parts indicated in Table 4 were dissolved in 20 ml of ethanol, followed by the same procedure as in Experimental Example 2, to prepare samples. Each of the samples contained 1 part by weight of squalane, 0.01 to 60 parts by weight of purified hydrogenated egg yolk lecithin and 200 parts by weight of ethanol, and the concentration of ethanol in each of the samples was 20 V/V %. The samples were left to stand for 30 days at room temperatures, and changes in appearance and percent transmittances at 640 nm, T_{640}(%), were determined.

Results:-

The results are shown in Table 4. It is seen from Table 4 that when 200 parts by weight of ethanol is used per part by weight of squalane, the amount of purified hydrogenated egg yolk lecithin may be not more than 50 parts by weight.

Table 4

Parts by weight of purified hydrogenated egg yolk lecithin	After standing at room temperature for 30 days		Stability
	Appearance	T_{640} (%)	
0.01	Clear solution	99.5	Good
0.02	Clear solution	97.5	Good
0.05	Clear solution	95.1	Good
0.1	Clear solution	96.7	Good
0.2	Clear solution	97.8	Good
0.5	Clear solution	98.8	Good
1.0	Clear solution	98.1	Good
2.0	Nearly clear solution	90.1	Good
10.0	Uniform emulsion	66.8	Good
30.0	Uniform emulsion	31.9	Good
50.0	Nearly uniform emulsion	6.3	Good
60.0	Lecithin was partly precipitated.	-	Poor

The parts by weight of the purified hydrogenated egg yolk lecithin in the table are per part by weight of squalane.

The following Examples illustrate the present invention more specifically.

Example 1

Ubidecarenone injectable preparation:-

Ubidecarenone	1.0	g
Purified egg yolk lecithin	0.4	g
Ethanol	65.0	ml
Macrogol 400	50.0	g
Sorbitol	45.0	g
Distilled water for injection	ad. 1,000	ml

Ubidecarenone and purified egg yolk lecithin were dissolved in ethanol, and then Macrogol 400 was dissolved in the solution. The resulting solution (solution I) was heated to about 45°C.

Sorbitol was dissolved in distilled water for injection, and the resulting solution (solution II) was heated to about 40°C.

The solution I prepared earlier was injected into the stirred solution II to prepare a solution of ubidecarenone. The solution was cooled to room temperature and filtered through a membrane having a pore diameter of 0.22 μm. The filtrate was dividedly put in ampoules. The ampoules were sealed up by melting and heat-sterilized at 115°C for 30 minutes to form ubidecarenone injectable preparations. The injectable preparations were clear in appearance and stable.

Example 2

Menatetrenone Injectable preparation:-

Menatetrenone	1.0 g
Purified sesame oil	0.4 g
Purified egg yolk lecithin	0.4 g
Purified soybean lecithin	0.2 g
Ethanol	90.0 ml
Macrogol 400	50.0 g
Glucose	50.0 g
Distilled water for injection	ad. 1,000 ml

Menatetrenone, purified sesame oil, purified egg yolk lecithin and purified soybean lecithin were dissolved in a mixture of ethanol and Macrogol 400, and the solution was maintained at about 50°C (solution I).

Glucose was dissolved in distilled water for injection, and the solution was maintained at about 45°C (solution II).

Thereafter, a menatetrenone injectable preparation was formed from the solution I and the solution II, by the same procedure as in Example 1. The injectable preparation obtained was nearly clear in appearance and remained stable with time.

Example 3

Skin lotion:-

Purified hydrogenated soybean lecithin	2.0 g
Tocopherol acetate	1.0 g
Squalane	1.0 g
Ethanol	140.0 ml
Glycerol	40.0 g
Sorbitol	40.0 g
Perfume	0.7 g
Purified water	ad. 1,000 ml

Purified hydrogenated soybean lecithin, tocopherol acetate, the perfume and squalane were dissolved in ethanol, and the solution was maintained at about 45°C (solution I).

Separately, glycerol and sorbitol were dissolved in purified water, and the solution was maintained at about 40°C (solution II).

Then, the solution I was injected into the stirred solution II to form a skin lotion which was uniform and bluish white with slight turbidity and stable.

Example 4

Skin lotion:-

Squalane	4.0 g
dl-α-tocopherol	1.0 g
Purified hydrogenated egg yolk lecithin	0.25 g
Ethanol	150.0 ml
Glycerol	40.0 g
Sorbitol	40.0 g
Perfume	0.5 g
Purified water	ad. 1,000 ml

Squalane, dl-α-tocopherol, purified hydrogenated egg yolk lecithin and the perfume were dissolved under heat in ethanol, and the solution was maintained at about 55°C. (solution I).

Separately, glycerol and sorbitol were uniformly dissolved in purified water, and the solution was maintained at about 45°C (solution II).

Thereafter, a skin lotion was prepared from the solution I and the solution II, in the same manner as in Example 3. The resulting skin lotion was uniform, slightly transparent, milky bluish white and stable.

Example 5

Medicated hair tonic:-

dl-α-tocopherol nicotinate	1.0 g
Squalane	2.0 g
Irgasan DP-300	0.5 g
Cholesterol	0.2 g
l-Menthol	0.5 g
Purified hydrogenated egg yolk lecithin	1.0 g
Ethanol	350 ml
Propylene glycol	60.0 g
Perfume	2.0 g
Purified water	ad. 1,000 ml

dl-α-Tocopherol nicotinate, Irgasan DP-300, cholesterol, l-menthol, the perfume and purified hydrogenated egg yolk lecithin were dissolved in a mixture of ethanol and propylene glycol, and the solution was maintained at about 45°C (solution I).

Purified water was heated and maintained at about 40°C (liquid II).

Thereafter, a hair tonic having a uniform, clear, bluish white appearance was obtained from the solution I and the liquid II, by the same procedure as in Example 3. The resulting hair tonic remained stable with time.

Example 6

Sunscreen lotion:-

Octyl-p-dimethyl-p-aminobenzoic acid	10.0 g
Squalane	1.0 g
Triglycerides of saturated fatty acids (C_8-C_{12})	1.0 g
Purified hydrogenated egg yolk lecithin	2.0 g
iso-Propanol	100.0 ml
Perfume	0.7 g
Macrogol 400	50.0 g
Propylene glycol	50.0 g
Purified water	ad. 1,000 ml

Octyl-p-dimethyl-p-aminobenzoic acid, squalane, triglycerides of C_8-C_{12} saturated fatty acids, the perfume and purified hydrogenated egg yolk lecithin were dissolved in a mixture of isopropanol and Macrogol 400, and the solution was maintained at about 50°C (solution I).

Separately, propylene glycol was dissolved in purified water, and the solution was maintained at about 40°C (solution II).

Thereafter, the same procedure as in Example 3 was applied to the solution I and the solution II to prepare a sunscreen lotion. The resulting sunscreen lotion had a uniform milk white appearance and was stable.

Example 7

Skin lotion:-

α-Bisabolol	0.5 g
Squalane	0.2 g
Purified hydrogenated soybean lecithin	20.0 g
Ethanol	80.0 ml
Perfume	0.3 g
Xylitol	40.0 g
Propylene glycol	40.0 g
Purified water	ad. 1,000 ml

α-Bisabolol, squalane, the perfume and purified hydrogenated soybean lecithin were dissolved in a mixture of ethanol and propylene glycol, and the solution was maintained at about 45°C (solution I).

Separately, xylitol was dissolved in purified water, and the solution was maintained at about 35°C (solution II).

Thereafter, by the same procedure as in Example 3, a skin lotion was prepared. The resulting skin lotion had a uniform milk white appearance and was stable.

Example 8

Drink preparation:-

Tocopherol acetate	1.0 g
Purified soybean lecithin	0.02 g
Hydrogenated egg yolk lecithin	0.03 g
Ascorbic acid	1.0 g
Sodium citrate	0.3 g
Sorbitol	50.0 g
Sucrose	80.0 g
Flavor	0.2 g
Ethyl paraben	0.1 g
Ethanol	10.0 ml
Propylene glycol	25.0 g
Purified water	ad. 1,000 ml

Tocopherol acetate, purified soybean lecithin, hydrogenated egg yolk lecithin and the flavor were dissolved in ethanol, and the solution was maintained at about 40°C (solution I). The solution I was injected under pressure into purified water warmed at about 35°C by the same procedure as in Experimental Example 1 to give a uniform, bluish white, clear solution.

To the solution was added propylene glycol having dissolved therein ascorbic acid, sodium citrate, sorbitol, sucrose and ethyl paraben. They were dissolved uniformly to obtain a liquid preparation for oral administration. This solution showed a uniform, bluish white, clear appearance and was stable.

Example 9

Lotion containing vitamin A acid:-

Vitamin A acid	2.0 g
Triglycerides of C_8-C_{12} saturated fatty acids	4.0 g
BHT	0.5 g
Natural vitamin E	0.1 g
Purified hydrogenated egg yolk lecithin	0.6 g
Ethanol	80.0 ml
Propylene glycol	40.0 g
Purified water	ad. 1,000 ml

Vitamin A acid, triglycerides of C_8-C_{12} saturated fatty acids, BHT, natural vitamin E and purified hydrogenated egg yolk lecithin were dissolved in ethanol under a stream of N_2 gas, and the solution was heated to about 45°C (solution I).

Separately, propylene glycol and water were dissolved, and the solution was heated to about 40°C (solution II).

Under a stream of N_2 gas, the solution I and the solution II were mixed by the same procedure as in Example 3 to form a lotion containing vitamin A acid. The resulting lotion showed a uniform, pale yellowish white appearance and was stable.

Example 10

Hair tonic:-

Tocopherol acetate	1.0 g
Squalane	2.0 g
Hinokitiol	0.5 g
Cholesterol	0.1 g
Benzyl nicotinate	0.05 g
l-Menthol	0.5 g
Purified soybean lecithin	4.0 g
iso-Propanol	50.0 ml
Ethanol	300.0 ml
Glycerol	60.0 g
Perfume	2.0 g
Purified water	ad. 1,000 ml

Tocopherol acetate, squalane, hinokitiol, cholesterol, benzyl nicotinate, *l*-menthol, the perfume and purified soybean lecithin were dissolved in a mixture of ethanol and isopropanol, followed by adding glycerol thereto. The solution was maintained at about 45°C (solution I).

Purified water was heated and maintained at about 40°C (solution II).

Thereafter, by the same procedure as in the preparation of the skin lotion in Example 3, a hair tonic having a uniform, bluish white, clear appearance was obtained. The resulting hair tonic remained stable with time.

CLAIMS

1. An aqueous liquid containing as essential components a fat-soluble substance, lecithin and at least one alcohol selected from the group consisting of ethanol and isopropanol, the volume of said alcohol being not more than 50 V/V % of the aqueous liquid, and the amount of lecithin being

(a) not more than 0.1 part by weight when ethanol is used as the alcohol in an amount of less than 50 parts by weight per part by weight of the fat-soluble substance,

(b) not more than 50 parts by weight when ethanol is used as the alcohol in an amount of at least 50 parts by weight per part by weight of the fat-soluble substance, or

(c) not more than 50 parts by weight when isopropanol or a mixture of ethanol and isopropanol is used as the alcohol.

2. The aqueous liquid of claim 1 wherein the fat-soluble substance is at least one member selected from the group consisting of vitamin A, vitamin E, vitamin D, vitamin K, ubidecarenone, derivatives of these substances, bisabolol, salicylic acid esters, p-aminobenzoic acid, derivatives of p-aminobenzoic acid, squalane, isopropyl myristate and vegetable oils.

3. The aqueous liquid of claim 1 or 2 which is an injectable preparation, an orally administratable liquid preparation, a lotion, a hair tonic, or a milky lotion.

Claims for Austria

1. A process for the preparation of an aqueous liquid containing as essential components a fat-soluble substance, lecithin and a at least one alcohol selected from the group consisting of ethanol and isopropanol, the liquid being used as medicine, cosmetic or foodstuff, characterized in that respective components are mixed in the following ratios: the volume of said alcohol being not more than 50 V/V % of the aqueous liquid, and the amount of lecithin being

   (a) not more than 0.1 part by weight when ethanol is used as the alcohol in an amount of less than 50 parts by weight per part by weight of the fat-soluble substance,

   (b) not more than 50 parts by weight when ethanol is used as the alcohol in an amount of at least 50 parts by weight per part by weight of the fat-soluble substance, or

   (c) not more than 50 parts by weight when isopropanol or a mixture of ethanol and isopropanol is used as the alcohol.

2. A process according to claim 1, characterized in that the fat-soluble substance or substances are selected from the group consisting of vitamin A, vitamin E, vitamin D, vitamin K, ubidecarenone, derivatives of these substances, bisabolol, salicylic acid esters, p-aminobenzoic acid, derivatives of p-aminobenzoic acid, squalane, isopropyl myristate and vegetable oils.

3. A process according to claim 1 or 2, characterized in that an injectable preparation, an orally administratable liquid preparation, a lotion, a hair tonic or a milky lotion is prepared.

4. An aqueous liquid used as cosmetic, the liquid containing as essential components a fat-soluble substance lecithin and at least one alcohol selected from the group consisting of ethanol and isopropanol, the volume of said alcohol being not more than 50 V/V % of the aqueous liquid, and the amount of lecithin being

(a) not more than 0.1 part by weight when ethanol is used as the alcohol in an amount of less than 50 parts by weight per part by weight of the fat-soluble substance,

(b) not more than 50 parts by weight when ethanol is used as the alcohol in an amount of at least 50 parts by weight per part by weight of the fat-soluble substance, or

(c) not more than 50 parts by weight when isopropanol or a mixture of ethanol and isopropanol is used as the alcohol.

5. The aqeous liquid of claim 4, characterized in that the fat-soluble substance is at least one member selected from the group consisting of vitamin A, vitamin E, vitamin D, vitamin K, ubidecarenone, derivatives of these substances, bisabolol, salicylic acid esters, p-aminobenzoic acid derivatives of p-aminobenzoic acid, squalane, isopropyl myristate and vegetable oils.

6. The aqueous liquid according to claim 4 or 5, characterized in that it represents an orally administratable liquid preparation, a lotion, a hair tonic or a milky lotion.